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ABSTRACT

This study assessed the effects of bizarreness, prompt modality, and prompt type for 144 five and eight year-old children on recognition memory of pictorial pairs. Presentation of stimuli was self-paced, allowing for the collection of study time and response latency data, as well as recording number correct. While both bizarre and nonbizarre forms of elaboration significantly facilitated performance relative to a standard condition, bizarre pair depictions significantly depressed noun-pair learning for five year olds. A reliable difference between bizarre and nonbizarre pairs for eight year olds was not observed. In addition, the combination of nonbizarre pairs and verbal prompts led to increased performance for five year olds, whereas nonbizarre pairs and pictorial prompts led to increased performance for eight year olds. With bizarre pairs, there was no variability attributable to modality for either age group. (Author)

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Effects of Bizarreness and Elaborative Prompts on Children's Pictorial Noun-Pair Learning[1]

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

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Running Head: Bizarreness and Noun-Pair Learning

Effects of Bizarreness and Elaborative Prompts on Children's Pictorial Noun-Pair Learning

The study of elaborative coding in children's memory has been of considerable interest to educational researchers since it frequently leads to high levels of performance. For paired-associate learning (PAL) Rohwer (1973) has defined elaboration as the process of generating an event that can serve as a referent for the to-be-remembered pair members. An event, in turn, consists of two objects and some episode, process, or relation involving both of them. In other words, elaboration creates meaningful relationships between isolated pair members.

With young children, the ability to engage in elaborative coding depends upon the type of prompt supplied by the experimenter. Rohwer (1973) has described different classes of prompts ranging from antagonistic to maximally explicit. The two classes most often compared have been minimal and augmented, with the former serving as a control condition. A minimal prompt consists of instructing the subject to learn or memorize the pairs in such a way as to be able to recall or recognize one member given the other. For augmented prompts, the experimenter provides an event, either verbally or pictorially, that can serve as a common referent for each pair. For example, a minimal verbal prompt with pictorial items would involve a side-by-side presentation of the pair

members with the experimenter labelling each item, whereas an augmented verbal prompt with pictorial items would involve the same type of presentation, but with the experimenter supplying a sentence that describes an event which encompasses both items (e.g., "The pig is smoking a pipe"). An augmented pictorial prompt with pictorial items would be defined by a picture of a pig smoking a pipe.

According to Rohwer, Kee and Guy (1975), it appears to make little difference whether the augmented prompt is verbal or pictorial, as both produce equally strong effects in comparison to minimally elaborated conditions. Similarly, item modality does not greatly affect the outcome. These authors suggested that future research be designed to explain the elaborative prompt effect itself.

One avenue that seems worth considering is the effect of bizarre pair depiction. The notion that bizarreness may be related to the elaborative prompt effect can be derived from several sources. First, it is standard operating procedure in noun-pair studies to randomly choose items to be paired. In most cases, the only restriction is to avoid highly associated pairs (e.g., table-chair). When the pairs are accompanied by an augmented prompt, bizarre depictions frequently result. Second, professional mnemonists have long advocated the use of bizarre mediators, imagery in particular. Lorayne and Lucas (1974), for example, recommend that in learning to associate two items one needs an image or picture that is impossible, crazy, illogical, or absurd. A logical or sensible picture is to be strenuously avoided. A third source of input comes from studies of the effects of incongruity on visual exploratory behavior. Nunnally and Lemond (1973) contend that most novel

or bizarre stimuli contain two or more cues which compete for the attribution of meaning, a situation which produces information conflict. It is this information conflict which elicits and maintains attention to the stimulus. The research results reported by Nunnally and Lemond (1973) strongly support the hypothesis. In 29 of 33 experiments which compared novel and banal stimuli, the novel stimuli dominated visual investigation.

While there have been several studies evaluating the effect of bizarreness on PAL, either through instructions to imagine two objects in a bizarre relationship (Briggs, Hawkins & Crovitz, 1970; Hauck, Walsh & Kroll, 1976; Nappe & Wollen, 1973) or with pictures depicting bizarre relationships (Senter & Hoffman, 1976; Wollen, Weber & Lowry, 1972), the results have been rather disappointing. Only one study (Andreoff & Yarmey, 1976) has reported an increase in recall due to bizarreness. However, all these studies employed undergraduate subjects with verbal recall of the response member from each pair as the major dependent variable. Whether or not similar results would be obtained with young children is open to question.

A recent study which did involve the target population was reported by Kee and Nakayama (Note 1). Working with five and seven year olds, they found that while both nonbizarre and bizarre pictorial elaboration facilitated performance relative to a minimally prompted condition, a reliable difference between the two types of elaborative prompt was not obtained for either immediate or seven day delayed retention.

While the Kee and Nakayama (Note 1) findings are compelling, this study should be examined more closely before concluding that bizarreness plays no role in the elaborative prompt effect. First of all, exposure

time was fixed and quite rapid (4 seconds per pair). Given the findings of Nunnally and Lemond (1973), perhaps increased study time would result in better performance for the bizarre conditions. Second, practice pairs were not provided to allow for warm-up and insure that subjects truly understood the nature of the task. Third, the dependent variable was again verbal free recall. If bizarreness has any effect at all, it should be more apparent under the demand of pictorial recognition. Lastly, verbal labels for the pictures were provided as they appeared, a curious procedure since all the stimuli were pretested for familiarity. More importantly, this appears to confound the design, since the provision of verbal labels constitutes a minimal verbal prompt (Rohwer, 1973). Indeed, Rohwer, Kee and Guy (1975) have noted the difficulty of interpreting previous research in this area due to the fact that the media examined have not been pure.

Kee and Nakayama (Note 1), upon comparing their findings with those of Rohwer and Levin (1968), also raised the possibility that the nature of the pair relationship may vary with prompt modality. The evidence from such a study could be seen as providing a basis for choosing between a single process theory of elaboration (e.g., Rohwer, 1973) and a dual processing theory (e.g., Paivio, 1971), at least as they pertain to children's noun-pair learning.

With this in mind, the present study was designed to assess the effects of bizarreness, prompt modality, and prompt type for five and eight year old children in recognition memory of pictorial pairs. Presentation of stimulus pairs was self-paced, allowing for the collection of study time and response latency data as well as number correct.

It was hypothesized that the eight year olds would significantly outperform the five year olds, no differences would result as a function of prompt modality, and augmented prompts would lead to a significantly higher level of performance relative to minimal prompts. Due to the relatively unknown nature of the bizarreness variable, no hypotheses concerning it were proposed.

Method

Design

The design of the experiment consisted of a 2 x 2 x 2 x 2 factorial with Age (five versus eight), Pair Depiction (bizarre versus nonbizarre), Prompt Modality (pictorial versus verbal), and Prompt Type (augmented versus minimal) serving as independent variables.

Subjects

A total of 165 children, 93 from kindergarten and 72 from third grade, participated in the study. From the kindergarten sample, two separate groups of 10 each were randomly chosen to evaluate the materials for familiarity/bizarreness and the difficulty level of the criterion test. One kindergarten subject was unable to complete the experiment. Thus, the final sample was comprised of 144 children, equally divided between kindergarten and third grade. The kindergarten children had a mean age of 5 years, 7 months, while the third graders had a mean age of 8 years, 7 months. The sample was drawn from a population of all the kindergarten and third grade children enrolled in a single elementary school.

Materials

The materials for the study consisted of 60 black and white line

drawings of objects likely to be familiar to elementary school children. Picture dictionaries, pre-primers, illustrated encyclopedias, and the like were used as sources for the drawings.

Ten kindergarten children were randomly selected to evaluate the materials for familiarity and bizarreness. First, each child was shown the drawings, one at a time, and asked to name them. Every child was able to identify every drawing. Following this, 36 of the 60 items were randomly selected and paired so as to produce the following study lists: Bizarre-Augmented Pictorial Prompt, Bizarre-Minimal Pictorial Prompt, Nonbizarre-Augmented Pictorial Prompt, and Nonbizarre-Minimal Pictorial Prompt. Thus, each set was comprised of the same items, but with different pairings. The remaining 24 items were used to construct three practice pairs for each set. Each set of three practice pairs and 18 study pairs was bound in an 8.5 x 11 inch spiral notebook. Each child was shown the 18 pairs from the Bizarre-Augmented Pictorial Prompt and the Nonbizarre-Minimal Pictorial Prompt lists and asked to tell the experimenter if there was anything strange or unusual about the picture. Given an affirmative or negative response, the child was asked to explain why it did or did not appear strange or unusual. Only one of the Bizarre-Augmented Pictorial Prompt pairs did not appear unusual to a majority of the children, and a more appropriate pair was substituted in its place. None of these children served as subjects in the actual study.

A multiple-choice criterion test was constructed for each set of materials by placing the stimulus member at the top of an 8.5 x 11 inch page with the response member and five distractors beneath in two rows of three each. The distractors were the response members from the other

17 pairs of that list. The position of the response alternatives was counterbalanced so that every alternative appeared an equal number of times at each position. The 18 pages for each test were bound in a spiral notebook in a random order to avoid duplicating the order of the study list. All test items were identical in appearance and spatial orientation to the study lists. An analogous test was constructed for the practice pairs with the exception that only three response alternatives were used.

A separate sample of ten kindergarten children was randomly selected to evaluate the difficulty of the criterion test. Their scores were sufficiently high to eliminate concern over possible floor or ceiling effects.

In addition to the pictorial prompts, minimal and augmented verbal prompts were constructed. A minimal prompt, in this case, was a sentence in which the noun pair was connected by a conjunction (e.g., "The crying tiger and the bearded baby"). An augmented prompt was a sentence in which the noun pair was connected by a verb (e.g., "The crying tiger is holding the bearded baby"). The prompts were presented orally by the experimenter.

To summarize, an augmented pictorial prompt was defined as two objects depicted in an interaction, a minimal pictorial prompt as two objects spatially separated, an augmented verbal prompt as two objects spatially separated plus a spoken sentence in which the pairs are connected by a verb, and a minimal verbal prompt as two objects spatially separated plus a spoken sentence in which the pairs are connected by a conjunction.

Procedure

The three pair practice list and 18 pair study list was administered to subjects individually for one study-test trial. Subjects were instructed to pay close attention to the pairs and learn them so as to be able to show the experimenter later which two objects were in each picture. Presentation rate was self-paced. Following the instructions, the practice list was administered. For subjects who appeared confused, the instructions were repeated and the practice list was shown again. After responding, subjects were given feedback by being shown the original practice pairs. Only one subject appeared unable to understand the nature of the task and was excluded from the study. Next, the study list was presented, subjects were engaged in a distractor task for three minutes (writing the alphabet), and the recognition test was administered. For the recognition test, subjects were informed that they would see seven pictures, one on the top and six on the bottom, and they were to point to the picture on the bottom they saw before with the one on the top. Feedback for study list performance was not given.

Results

The procedures previously described allowed three indices of performance to be examined: number of response members correctly recognized, study time, and response latency. Each index was subjected to separate analyses as the relationships among them were quite low. The largest correlation ($r = .18$) was between study time and response latency. Type 1 error rate for all tests was set at .05.

Number Correctly Recognized

The mean number of response members correctly recognized was subjected to an analysis of variance. As expected, there was a significant main effect for Age, $F(1,128) = 13.54$, $p < .001$, with eight year olds excelling over the five year old subjects. Also, as expected, a highly significant main effect for Prompt Type appeared, $F(1,128) = 172.74$, $p < .001$, with augmented prompts resulting in a level of performance more than twice that of minimal prompts (12.12 versus 5.18).

As Figure 1 shows, there was a significant interaction between Age and Pair Depiction, $F(1,128) = 5.11$, $p < .05$, indicating that the eight year olds were not affected by the Pair Depiction variable, whereas bizarre pairs depressed the performance of the five year olds. A simple main effects analysis (Kirk, 1968) confirmed that performance for the eight year olds across the two levels of Pair Depiction was equivalent, whereas the five year olds recognized significantly more nonbizarre than bizarre pairs. Also, the eight year olds recognized significantly more bizarre pairs than the five year olds, whereas no difference occurred with nonbizarre pairs.

Insert Figure 1 About Here

A highly similar interaction between Age and Prompt Modality was also obtained, $F(1,128) = 5.11$, $p < .05$. Simple main effects analysis revealed that performance for the eight year olds across the two levels of Prompt Modality was equivalent, whereas the five year olds performed significantly better with verbal rather than pictorial prompts. Also,

the eight year olds performed significantly better than the five year olds with pictorial prompts, whereas no difference between the two groups occurred with verbal prompts.

Prompt Modality significantly interacted with Prompt Type, $F(1,128) = 6.10$, $p < .05$. Simple main effects analysis revealed a significant improvement in performance with minimal prompts when the prompt modality changed from pictorial to verbal, whereas no such change occurred with augmented prompts. Also, performance with augmented prompts was significantly greater than with minimal prompts for both modalities.

A significant three-way interaction was observed between Age, Pair Depiction, and Prompt Modality, $F(1,128) = 4.87$, $p < .05$, indicating that nonbizarre pairs with a verbal prompt produced the highest level of performance for the five year olds, but the lowest level of performance for the eight year olds. Thus, the Age x Pair Depiction interaction would not have been significant were it not for the performance of the five and eight year olds in the nonbizarre pair-verbal prompt conditions.

Lastly, there was a significant interaction between Age, Pair Depiction, Prompt Modality, and Prompt Type, $F(1,128) = 5.59$, $p < .05$, indicating that five year olds outperformed the eight year olds in the presence of nonbizarre pairs with augmented verbal prompts and non-bizarre pairs with minimal verbal prompts. Table 1 presents the mean number of correct responses as a function of these variables.

Insert Table 1 About Here

Study Time

The average amount of time subjects took to study the 18 pairs was subjected to an analysis of variance. The only significant main effect observed was for Pair Depiction, $F(1,128) = 9.35$, $p < .001$. Inspection of the cell means revealed longer study times in response to bizarre pairs (5.85 sec. versus 4.11 sec.).

Although the main effect for Age was nonsignificant, $F(1,128) = 1.33$, $p < .05$, eight year olds did spend more time studying the pairs than did the five year olds.

The only significant interaction to appear involved Age and Prompt Modality, $F(1,128) = 5.14$, $p < .05$. Simple main effects analysis revealed eight year olds spent more time studying the pairs under pictorial prompts than did five year olds, whereas no difference existed under verbal prompts. Also, eight year olds studied longer under pictorial than verbal prompts, whereas study time for five year olds did not vary across prompt modality.

One other finding, though not significant, was interesting nonetheless. The Age x Pair Depiction interaction, $F(1,128) = 3.04$, $p < .10$, indicated eight year olds spent more time studying bizarre than nonbizarre pairs and spent more time with bizarre pairs than did the five year olds. On the other hand, Pair Depiction did not seem to affect the study time of five year olds, nor was there any difference between the two age groups with nonbizarre pairs.

Response Latency

For this analysis, the only source of variance to reach significance was the interaction between Age and Prompt Type, $F(1,128) = 12.82$,

$p < .001$. Simple main effects revealed five year olds responded faster under a minimal prompt condition, whereas eight year olds responded faster under an augmented prompt condition. Also, five year olds took longer to respond than did eight year olds under augmented prompts, whereas response latency for the two age groups was equivalent under minimal prompts.

Discussion

Although the present study employed different dependent measures and a somewhat different operationalization of bizarreness, results similar to those of Kee and Nakayama (Note 1) were obtained; bizarre pair depictions did not facilitate pictorial noun-pair learning. In fact, for the five year olds, they significantly depressed performance. On the other hand, both bizarre and nonbizarre forms of elaboration greatly facilitated performance relative to a standard, or minimal prompt, presentation.

These results can be explained by appealing to the theoretical framework of Nunnally and Lemond (1973). Recall that they attributed increased visual exploratory behavior to the information conflict that is inherent in novel stimuli. Thus, to the extent that novel stimuli are difficult to encode because of conflicting cues, performance should suffer, particularly if study times are brief. This is exactly what was found in the present investigation. Combining the analyses for number correct and study time, we see that with bizarre pairs the eight year olds exhibited longer study times and a higher level of performance in contrast to the five year olds, but with nonbizarre pairs there were no differences across age for either variable. This also fits nicely

with a study by Aitken and Hutt (1975), who found that seven year olds exhibited a clear preference for incongruous versus banal stimuli, whereas five year olds did not.

These results can also be explained in accordance with Rohwer's (1973) theoretical framework for elaboration and noun-pair learning. An important feature of his analysis concerns event quality, particularly as it pertains to the relationship or "balance" between the two nouns. For example, given the pair MAN-BOOK, an elaborative prompt of the type, The man sat on the book, should prove to be less effective than a prompt which reads, The man read the book. "It is only an incidental property of a book that it can be sat upon, whereas its readability is a central property." The augmented bizarre prompts in the present study and others cited earlier were clearly portraying incidental relationships of noun-pairs.

Although the main effect for Prompt Modality was nonsignificant, as hypothesized, it did interact with Age and Pair Depiction. With bizarre pairs, there was no variability attributable to modality for either age group. However, with nonbizarre pairs, verbal prompts led to increased performance for five year olds, whereas pictorial prompts led to increased performance for eight year olds. Once again, the results of the study time analysis provide additional confirming evidence. The five year olds exhibited longer study times with verbal prompts, whereas the eight year olds exhibited longer study times with pictorial prompts. Thus, the question as to whether modality impacts on the underlying elaboration process seems to turn on the nature of the pair depiction. In other words, a clear cut choice between Rohwer's

(1973) single process hypothesis, where modality is unimportant, and Paivio's (1971) dual processing explanation, which emphasizes modality differences, cannot be made, at least for young children. The inconsistency of this finding with that of Rohwer, Kee, and Guy (1975), who found no developmental differences for prompt modality, is likely due to the confounding of bizarre and nonbizarre pair depiction in their study.

To date, bizarreness has not fulfilled its role as a facilitator of elaborative encoding. However, the issue should not be considered closed. Neisser (1976, p. 140), for example, has argued that "such experiments typically use naive subjects for whom the whole situation necessarily creates a unique context, and they have usually tested for immediate rather than delayed recall." One could also raise the question, What is the difference between bizarre, novel, and incongruous stimuli? Existing research tends to treat them as equivalent. Attempts should be made to investigate both of these issues.

Reference Note

1. Kee, D. W. & Nakayama, S. Y. Children's noun-pair retention: Assessment of pictorial elaboration and bizarreness effects. Paper presented at the biennial meeting of the Society for Research in Child Development, New Orleans, March 1977.

References

Aitken, P. P., & Hutt, C. The effects of stimulus incongruity upon children's attention, choice, and expressed preference. Journal of Experimental Child Psychology, 1975, 19, 79-87.

Andreoff, G. R., & Yarmey, A. D. Bizarre imagery and associative learning: A confirmation. Perceptual and Motor Skills, 1976, 43, 143-148.

Briggs, G. G., Hawkins, S., & Crovitz, H. F. Bizarre images in artificial memory. Psychonomic Science, 1970, 19, 353-354.

Hauck, P. D., Walsh, C. C., & Kroll, N. E. A. Visual imagery mnemonics: Common vs. bizarre mental images. Bulletin of the Psychonomic Society, 1976, 7, 160-162.

Kirk, R. E. Experimental design: Procedures for the behavioral sciences. Belmont, California: Brooks/Cole, 1968.

Lorayne, H., & Lucas, J. The memory book. New York: Ballantine, 1974.

Nappe, G. W., & Wollen, K. A. Effects of instructions to form common and bizarre mental images on retention. Journal of Experimental Psychology, 1973, 100, 6-8.

Neisser, U. Cognition and reality. San Francisco: W. H. Freeman, 1976.

Nunnally, J. C., & Lemond, L. C. Exploratory behavior and human development. In H. W. Reese (Ed.) Advances in child development and behavior (Vol. 8). New York: Academic Press, 1973.

Paivio, A. Imagery and verbal processes. New York: Holt, Rinehart and Winston, 1971.

Rohwer, W. D., Jr. Elaboration and learning in childhood and adolescence. In H. W. Reese (Ed.), Advances in child development and behavior (Vol. 8). New York: Academic Press, 1973.

Rohwer, W. D., Jr., Kee, D. W., & Guy, K. C. Developmental changes in the effects of presentation media on noun-pair learning. Journal of Experimental Child Psychology, 1975, 19, 137-152.

Rohwer, W. D., Jr., & Levin, J. R. Action, meaning, and stimulus selection in paired-associate learning. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 137-141.

Senter, R. J., & Hoffman, R. R. Bizarreness as a nonessential variable in mnemonic imagery: A confirmation. Bulletin of the Psychonomic Society, 1976, 7, 163-164.

Wollen, K. A., Weber, A., & Lowry, D. H. Bizarreness versus interaction of mental images as determinants of learning. Cognitive Psychology, 1972, 3, 518-523.

Table 1

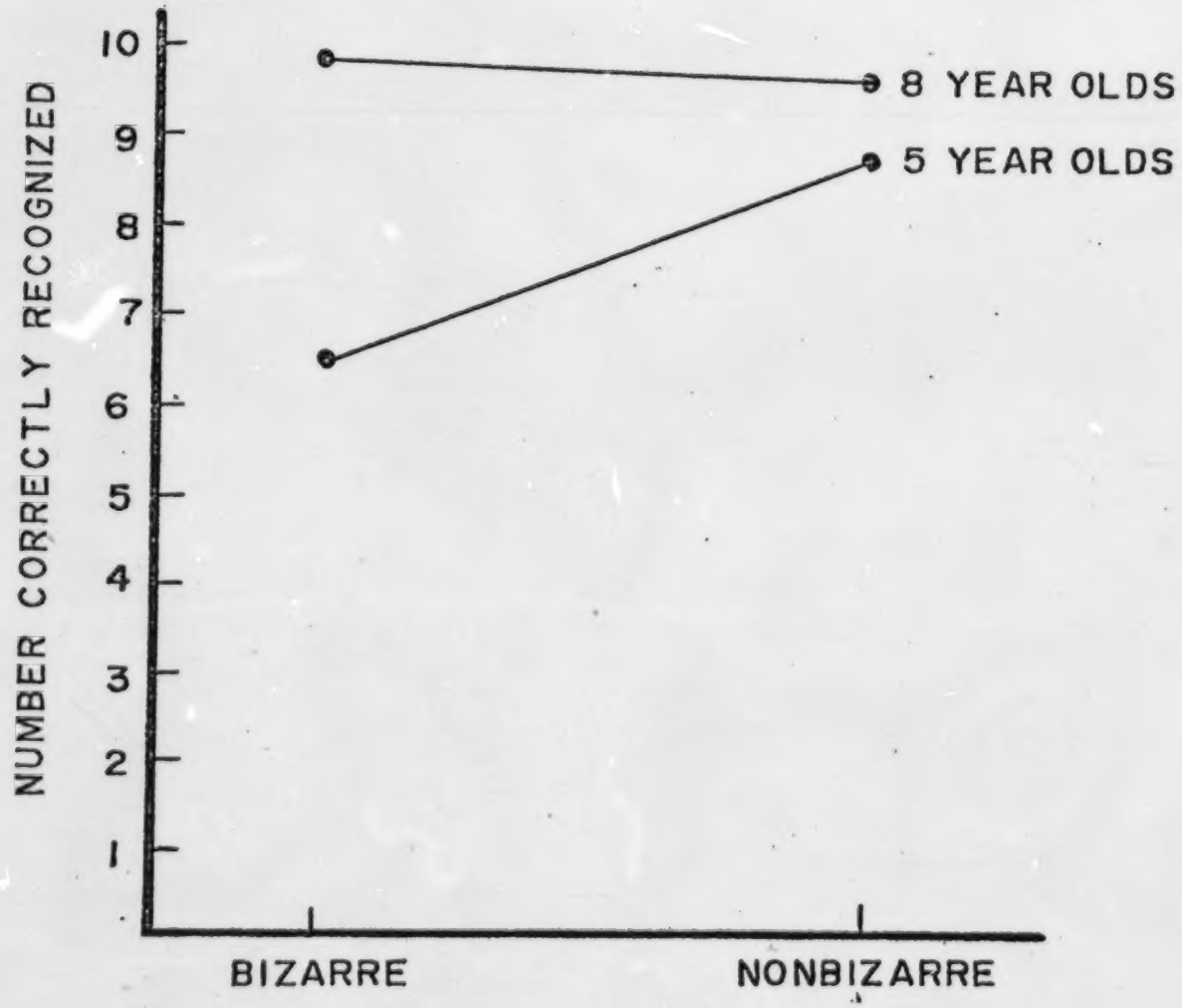
Mean Number of Correct Responses as a Function of Age, Pair Depiction, Prompt Modality, and Prompt Type

	Age	
Prompts	5	8
Bizarre Pairs		
Pictorial		
Augmented	9.2	12.3
Minimal	2.7	6.0
Verbal		
Augmented	8.8	14.2
Minimal	5.4	6.3
Nonbizarre Pairs		
Pictorial		
Augmented	11.5	16.8
Minimal	3.6	4.5
Verbal		
Augmented	13.0	10.8
Minimal	6.8	5.7

Note: MSe (128) = 10.05

Figure Captions

Figure 1. Age by pair depiction interaction


NUMBER CORRECTLY RECOGNIZED
10
9
8
7
6
5
4
3
2
1
8 YEAR OLDS
5 YEAR OLDS
BIZARRE
NONBIZARRE